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ULLETIN 208 APRIL, 1903

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MICHIGAN

STATE AGRICULTURAL COLLEGE

EXPERIMENT STATION

BOTANICAL DEPARTMENT

MICHIGAN MUSHROOMS

A FEW OF THE COMMON EDIBLE FUNGI OCCURRING IN THE STATE

BY

BURTON O. LONGYEAR

AGRICULTURAL COLLEGE, MICHIGAN
1903

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99—Michigan soils.
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160—Some Insects of the year 1897.
162—Forestry.
163—Strawberry Culture.
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190—Vegetable Tests for 1900.
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194—Report of South Haven Sub-station for 1901.
195-6—(One volume.) Strawberry notes for 1901. Notes on vegetables.
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198—Sand lucerne.
199—Cow peas, soy beans, and winter vetch.
200—Some insects of the year 1901.
201—Aeration of milk (summary of special No. 16).
202—Fertilizer analysis (1902).

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BULLETIN NO. 208. **APRIL, 1903**

MICHIGAN MUSHROOMS.

A FEW OF THE COMMON EDIBLE FUNGI OCCURRING IN THE STATE.

BY B. O. LONGYEAR.

The abundance and variety of fleshy fungi found growing in dooryards, fields and woods at certain seasons of the year have doubtless attracted the attention of many persons in this State. These plants are especially numerous during the spring and autumn months and whenever there is a plentiful rainfall during the summer. However, they are usually passed by and left for the "worms" or scattered with a kick. Thus a free offering frequently near our very door-step may be neglected or spurned while the same product is being imported from foreign lands and sold for a high price in the markets. Naturally the question arises why pay fifty cents to one dollar a pound for mushrooms from France or for hot house grown material when a generous supply of the same, or of equally desirable species, is going to waste about us?

There are many persons in our State who would be glad to eat our native mushrooms were it not for fear of poisoning. That this fear is well founded is shown by the fact that many cases of severe illness and even loss of life are annually recorded through carelessness in the indiscriminate eating of fungi.

Moreover the prevailing ignorance and superstition regarding these plants have added to the uncertainty which seemed to attend their use as food. And while this fear has often served a useful purpose in restraining many persons from carelessness in the eating of mushrooms, it has also prevented them from making use of a highly esteemed natural food product, obtainable often without expense other than the effort necessary to gather it.

It is stated that in Germany the school children are regularly trained in the matter of distinguishing the edible and poisonous species of fungi so that they can readily identify them even when mixed together. Certainly there seems no good reason why the intelligence of the average American should not enable him to learn to recognize a number of the common edible mushrooms with which everyone who has access to woods and fields is sure to meet.

Moreover many of the fleshy fungi can be as easily and surely recognized as our common flowering plants. Were this more generally understood and the fear from poisoning thereby removed the use of edible fungi as food would certainly increase.

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Figure 1. The Common Morel (Morchella esculenta).—(Original.)

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SOME POPULAR ERRORS ABOUT MUSHROOMS.

Much of the uncertainty which to many persons seems to attend the collecting of the edible fungi is fostered by the many popular errors concerning the true nature of these plants and the means by which they may be identified. These mistaken notions, which often amount to superstition, are largely due to the fact that a large part of the development of these plants is hidden from view. Consequently their ways are shrouded in mystery to the average observer. Then, too, their sudden appearance coupled with the fact that they often grow in dark, damp places where most other plants do not thrive, lends to them an unnatural, strange or uncanny aspect which may often prove a fertile source of suggestion to the superstitious mind.

Thus it seems to be no uncommon belief that in some mysterious way toads have something to do with them, hence the term toadstool, which suggests to the imaginative mind the picture of a toad squatting on top of one of these plants. It is to be very much doubted if any person ever saw a toad in such an unusual and uncomfortable position. Moreover many of them are incapable of supporting the weight of even the smallest toad, while others often grow where no toad has ever been. In fact there is no more foundation for such a belief than there would be for an idea that toads cause the growth of other plants near which they may happen to be found.

One very common error in the use of these terms is that a mushroom and a toadstool are two distinct things, hence the oft repeated query, "How do you tell a mushroom from a toadstool?" To the surprise of the inquirer the answer of the botanist is that there is no difference. This leaves the matter in greater doubt than before. The person who is able to recognize one fungus as edible usually applies to it the term mushroom and calls all others toadstools; while another person may be familiar with the edible qualities of a number of kinds and use the same method of naming them. Thus it will be seen that what would be a toadstool to one person, would be a mushroom in the vocabulary of another, and with equal propriety in each case, therefore the synonymy of the two terms is established through popular usage. Moreover, no scientific distinction is made between these two terms. It is evident, therefore, that there are edible toadstools as well as poisonous mushrooms.

This question is also suggestive of the prevalent idea that there is some short and reliable test or rule that can be applied and which like a lucky-stone, will guide its possessor in the selection of the good and the avoidance of the harmful kinds of fungi. Thus the collector of fungi for scientific purposes is often warned, by the persons whom he meets, against eating any of the specimens in his basket, while some sure and time-honored formula is condescendingly proffered. The expressions of amazement and incredulity on the faces of these persons when told that all of your specimens except, perhaps, two or three, are edible, are often amusing to see.

Many otherwise well informed persons claim to be able to "tell a mushroom" by some such test as the following: The cap must peel readily; they are pink underside; they should not blacken a silver spoon in cooking; must have no disagreeable taste nor odor; should turn dark when

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salt is sprinkled on underside; avoid those having bright colors, etc., etc. These are only a very few of the rules or so called tests that are supposed by many persons to enable them to discriminate between good and bad fungi. It is not strange that the terrible fatalities, that now and then occur from eating poisonous mushrooms, should be found among the ranks of those who have faith in the above means of discrimination. It is only to be wondered at that they do not occur more often. for while some of these rules might serve to exclude "The Deadly Amanita" and its noxious relatives, others are no more to be relied upon than is a horse-shoe over the door in an epidemic of smallpox. Furthermore, most of these rules exclude many of our choicest and most abundant food species of mushrooms.

If then, there is no easy set of rules, no reliable test that will exhibit the danger signal, how is the novice to know when gathering the fungus offerings of woods and fields, that he is not placing himself in a fair way to become a subject for the coroner and the undertaker?

The real question to be answered is, how can we learn to know the edible from the poisonous species of mushrooms and toadstools?

The popular demand for some short and easy way to make this discrimination, has often led to the adoption of some artificial means in lieu of the only safe and natural method, the use of the botanical characters of each fungus. It is desirable, therefore, in gaining a correct conception of the mushrooms and toadstools, to realize that each kind has certain definite characters which, when familiarized, admit of ready recognition. It is also a well established fact that some species of fungi are wholesome while others are poisonous. Thus it logically follows that if a person is familiar with the specific characters of any species of edible fungus, he may safely collect that species for food. This is the method pursued by many persons who know only one or two kinds, and so long as they have recourse only to those species with which they are familiar they incur no more risks than in the use of other articles of food. Therefore, a preliminary answer to the foregoing question would be, before using any mushroom for food, learn to recognize it by its botanical characters, or at least *become so familiar with its appearance that it can be recognized under all circumstances.*

If, in addition to such information, the specific characters of the few poisonous kinds, apt to be met with, are also familiar to the mushroom hunter, an additional safeguard is assured, and one which will enable him to discard those species which are the most common cause of disaster. One of the most encouraging features of this subject, contrary to the usual supposition, is the fact that most of the species of mushrooms and toadstools are either edible, or are at least possessed of no dangerous qualities. And fortunately the comparatively few species, which do possess a dangerous and poisonous principle, also have a structural character which when familiarized, admits of ready identification.

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VEGETATIVE OR EARLY STAGE OF GROWTH.

To the ordinary observer, mushrooms and toadstools seem to be of spontaneous origin. This is not to be wondered at when we see them standing in profusion, where only a day or two before nothing but grass or bare ground was seen, or on going into the nearby woods, find a familiar log or stump covered with fungus excresences. But that which appears to come up in a night, is really the result of growth that has occupied weeks and possibly months or years in its development. This vegetative part of the fungus, hidden from sight in the soil, rotting wood or decaying vegetable matter, is known to the botanist as mycelium, and to the mushroom grower as spawn. This mycelium consists of slender branching threads, delicate as the web that the spider spins, branching again and again, penetrating all parts of the substance in which it grows in search of food materials, and finally forming root-like strands or felted masses composed of interwoven threads.

Figure 2. Root-like strands of mycelium of the pear-shaped Puff-ball growing in rotten wood. Young puff-balls in the form of small, white knobs are forming on these strands. Natural size.—(Original.)

These branching and interlacing strands and threads of mycelium can often be found by overturning logs and rotting leaves in the woods where they sometimes appear, rivaling in delicacy and beauty the crystal tracery of Jack Frost's breath on the window pane. Under the proper conditions of moisture and temperature and in the presence of materials that will furnish food, this growth of mycelium goes on with considerable rapidity and may cover considerable areas.

Fungi differ from most other plants in the fact that they have no leaves nor anything to do the work of leaves, consequently they are unable to assimilate the raw food materials of the soil and air, but must depend on animal or vegetable matter already formed. For this reason mushrooms

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and toadstools are found most abundant where such materials are in a state of decay, as about manure heaps, in fertile fields and meadows, among the decaying leaves and sticks in the forest, while logs and stumps furnish a favorite resort for many kinds. Indeed, this process of decay is largely due to the dissolving and absorbing action of the mycelium of fungi on the tissues of these substances. This effect is very noticeable in those kinds which grow on wood. It is surprising to see how soon the fallen branch or prostrate trunk becomes the prey of the insidious and greedy mycelial threads of such fungi.

This silent, unobtrusive growth of the mycelium continues until a sufficient development has been reached for the production of the fruiting stage of the fungus in the form of the mature mushrooms. Or, if but little moisture is present, this growth is correspondingly slow, being entirely checked when dry. On renewal of the water supply, as during a rainy spell, the mycelial growth is resumed. Soon little enlargements or knobs appear on the largest of the mycelial strands or at some portion of the mycelial system. These rapidly enlarge, fed from the connecting threads of the mycelium, until in many cases we can detect the form of the mature fungus into which they are to develop. If moisture is now plentiful and the temperature favorable, the succeeding stages are rapid, the small, closely packed cell-filaments of the little knobs rapidly expanding into those of the full grown fungus.

This in brief, is the general process of development of the fleshy fungi which comprise the mushrooms and toadstools.

FUNGUS SPORES.

The ultimate object of every fungus is spore production. These spores are microscopic bodies produced in immense numbers on the fruiting form of the fungus and so small and light that they float in the air as an invisible dust. Many of them fall on the ground near the place where

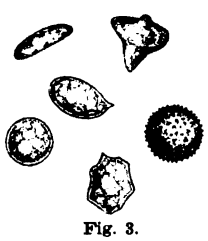

Fig. 3.

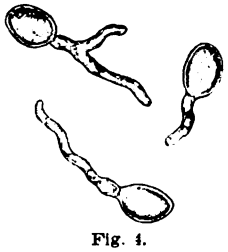

Fig. 4.

Figure 3. A few of the different shapes of fungus spores. Highly magnified.
Figure 4. Mushroom spores germinating by sending out a slender germ-tube.—(Original.)

they are produced and are washed into the soil or carried away by rains. Others are wafted away in every breeze, possibly carried for days on the wings of the wind, to be brought down at length, by dew or rain, long distance from their starting points. In this way they are carried to the ends of the earth, dusted into every crack and cranny, on every exposed surface of wood or humus, or cast upon some water's surface. Like the seed, mentioned in the parable, many of them perish, but they are sown with a generous hand, and some are sure to fall into good ground.

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Those spores which find a favorable resting place may germinate by sending out, usually, a slender thread-like tube, which at once branches out in search of food materials. In this way the mycelium is established.

STRUCTURE AND CLASSIFICATION OF FUNGI.

If a small fragment of some fleshy fungus is examined with a microscope of high magnifying powers, it will be found to be made up of interwoven, branching, tubular filaments, often with delicate partitions dividing the tubes into cells. Thus the body of the fungus is shown to be constructed from the same kind of threads as the mycelium, in fact, it is a continuation of the mycelial filaments closely interwoven and often grown together. In the densest portions of some very hard fungi the mycelial filaments are not only interlaced and grown together, but are divided into short cells, by numerous cross partitions, while the walls are much thickened. In soft fungi the mycelial tubes are loosely interwoven and have thin walls with fewer partitions.

Fig. 5.

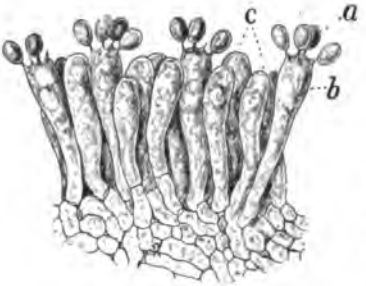

Fig. 6.

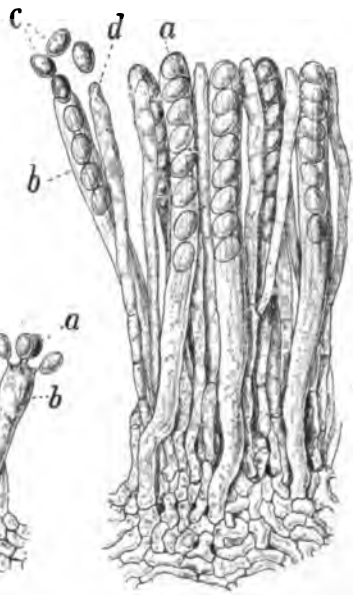

Fig. 7.

Figure 5. Small portion from the stem of a Morel showing cell-filaments. Highly magnified.
Figure 6. Small portion of a section through the spore-bearing layer (hymenium) of a mushroom which produces its spores on the ends of cells called basidia. (a) spores; (b) a basidium; (c) sterile cells. Highly magnified.
Figure 7. Small portion of a section through the spore-bearing part of a Morel, in which the spores are produced in little sacks known as asci. (a) an ascus; (b) an ascus discharging its spores; (c) sterile cells. Highly magnified.—(Original.)

Fungi are classified according to their various modes of spore production. The fleshy fungi belong in two great classes known as Basidiomycetes and Ascomycetes. In the former class the spores are formed on the ends of little elongated cells called Basidia, while in the latter

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they are formed in minute closed sacks known as asci. In most cases only certain limited portions of the fungus take part in this process of producing spores, these parts being covered with a thin layer of tissue called the hymenium or spore-bearing layer. This hymenium, therefore, is made up partly of basidia or of asci. This depending upon whether the species belongs to the first or to the second of the two classes mentioned.

The Basidiomycetes are further subdivided into the Hymenomycetes, in which the hymenium is on some exposed part of the fungus, and the Gastromycetes in which the hymenium lines the interior of irregular cavities in the body of the fungus.

The shape of the hymenium-bearing part is made use of in subdividing each class and group. Thus, in the Ascomycetes the hymenium is found covering the outside of clubs, wrinkles or ridges, spreading over flat surfaces and lining the interior of cups. While in the Hymenomycetes various forms of spines, clubs, gills and pores furnish a foundation for the spore-bearing layer.

METHODS OF LEARNING TO RECOGNIZE EDIBLE FUNGI.

There are three principal ways by which the beginner, who wishes to collect fungi for eating, may learn to know the edible kinds. First, the personal physiological test suggested in Wm. Hamilton's book on edible fungi. This consists of chewing a very small piece of the fungus, whose edible properties we wish to determine, and then ejecting it without swallowing the juice. If no unpleasant symptoms arise within the next twenty-four hours, another very small piece is to be chewed and a little of the juice swallowed. Should no indications of poisonous qualities appear after another period of waiting, a slightly larger piece may be chewed and swallowed. If the piece used is not larger than a small pea no harm will result even if a poisonous species were being tested. In this way a person may learn to recognize certain kinds as edible and to enlarge his list of such species gradually. While this method may be followed with safety by a careful person, it is not especially recommended to persons who are not willing to make a physiological laboratory of their stomachs.

The second method consists of learning the characters of edible species from some person already familiar with them, and while this is the best way in which to study the subject, only a few persons in the state are apt to have the beuefit of a personal instructor who is at all competent to give reliable instruction along this line.

Therefore, the majority of persons who wish to know some of the edible fungi will probably rely on the third method which consists of the study of carefully prepared figures and descriptions in books and bulletins.

The writer recommends that the novice become familiar with a few of the commonest and most easily recognized kinds of mushrooms and that he gradually widen his acquaintance with these plants, thoroughly learning the structural characters and habits of each until they can be readily distinguished. Do not be in too great a hurry to know all the edible species which grow in your neighborhood. The gardener does not learn to recognize all the varieties of vegetables in one season. However, a few new acquaintances may be gained each season if one has books and

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pictures to refer to. Moreover, it is no more difficult to distinguish between many of the common kinds of fungi than it is to learn to separate peaches from apples or potatoes from turnips.

In this Bulletin the writer will confine himself to two groups of fleshy fungi which have been selected on account of the ease with which they may be identified, and because they do not contain any poisonous species.

THE EARLIEST FUNGI.

About the earliest mushrooms to be looked for are the Morels; those fungus counterparts of the Spring Beauty, the Dogtooth Violet and the Trillium, plants which are able to spring into early bloom by means of a stock of nourishment accumulated during the previous season. Thus these earliest species of fleshy fungi are able to appear as soon as the frost leaves the woods because they have a mycelial system which became well established during the summer before, to be matured by the frosts of winter and awakened into activity by the warmth and moisture of spring.

The Morels are so characteristic in appearance that when they are once identified it is an easy matter to recognize them ever after. And as none of them are known to be poisonous or disagreeable, they form one of the safest groups for the beginner to collect.

On examining a specimen two parts are noticed,—a hollow stem of varying slenderness, supporting at its apex a head or cap (the pileus), covered with wrinkles or ridges. These ridges branch and unite, thus forming pits of varying shapes and sizes.

The spore-bearing layer or hymenium covers the sides of these ridges and is thereby largely increased in area. Under a compound microscope, a thin section through one of the ridges shows the hymenium to be composed of slender spore-sacks (asci) standing side by side, like blocks in a pavement. Fig. 7. As the spore-bearing layer matures the pressure becomes great enough to rupture the exposed ends of the asci when the spores are quite forcibly expelled.

The spores, usually eight in each ascus, are mostly of an ochre yellow color when seen in a layer on white paper. They may be readily obtained from mature specimens by placing the cap on white paper and covering with a paper cone or box for a few hours.

Several of the so called species of morels are to be found in Michigan. On account of their close resemblance most of these species are separated with much difficulty, even by the expert botanist. However, this enables the beginner to recognize them all the more readily as a group, and as the species are equally desirable for eating, the novice will not need to hesitate when the exact species is not recognized.

The Two-Sporcd Morcl. (Morchella bispora.)

This morel derives its name from the fact that each spore sack (ascus) contains two large spores, while those of the other morels contain eight spores each. The pileus or cap is thimble-shaped, with the ridges running mostly from the top to bottom and it is fastened to the stem only at the very apex. Color, buff or brownish yellow, white underneath. The smooth, white stem is usually three or four inches tall, hollow, and often a little swollen near the base. The whole fungus is tender and fragile.

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This is one of our earliest morels, often appearing with the opening of the pussy willows and the advent of the yellow warbler. It is also the rarest and most delicate member of its tribe, however, it sometimes occurs in considerable numbers, frequenting rather low, moist woods amid decaying leaves.

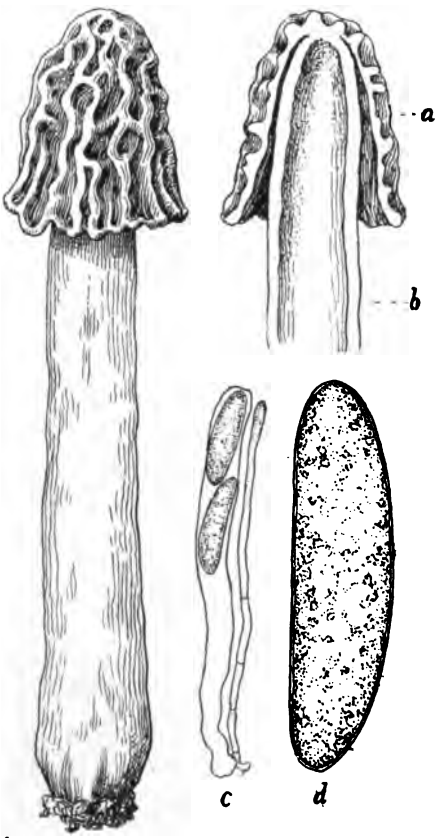

Figure 8. Drawing of two-spored Morel (Morchella bispora). (a) cap or pileus; (b) stem, in section, about natural size; (c) an ascus containing two large spores; (d) a spore. Highly magnified.—(Original.)

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Figure 9. Two-spored Morel amid its natural surroundings.—(Original.)

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The Half-Morel. (Morchella Semilibera.)

As its name implies, this morel has the lower half of the pileus free from the stem. The pileus is mostly conical in shape with longitudinal ridges and pits. The white stem is somewhat mealy or scurfy, hollow and often swollen at the base. This fungus is usually a little later than the two-spored morel, grows in similar places and is not usually common.

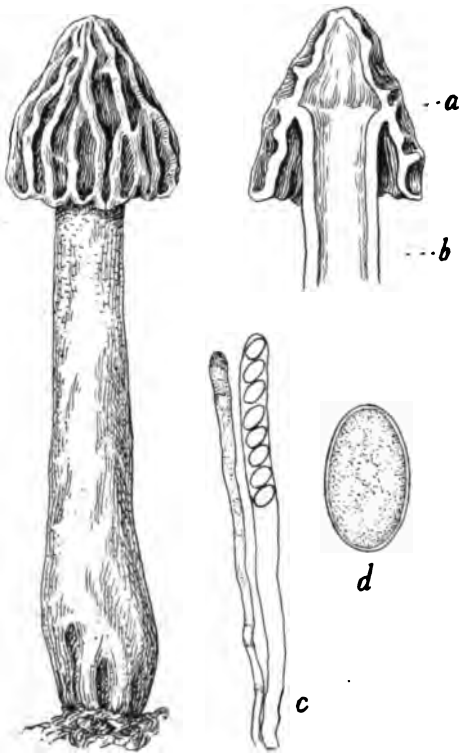

Figure 10. The half-free Morel (Morchella semilibera). (a) cap; (b) stem, in section, about natural size; (c) an ascus containing eight spores; (d) a spore. Highly magnified. —(Original.)

The Narrow Cap Morel (M. angusticeps) and the Conical Morel (Morchella Conica).

These two morels are so nearly alike in many cases as to make it very difficult to separate them satisfactorily. In both species the cap is considerably longer than broad, in some cases very narrow and pointed, in others broadly conical. The ridges extend from base to apex, being con-

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Figure 11. The Narrow-cap Morel (Morchella angusticeps). Natural size.—(Original.)

nected at intervals by smaller ridges and forming long, narrow pits. The pileus which possesses a brownish drab color, is wholly attached to the stem, thus having no free margin. The typical Narrow-cap Morel has a stem which is nearly as large as the cap in diameter and varying much in length, while in the true type of the Conical Morel it is considerably narrower than the cap. Both have whitish hollow stems which are often scurfy on the outside. They sometimes occur in orchards, but are apt to be found in the vicinity of black ash trees, in low woods and along their margins. They often appear early in April, even before frosts have ceased.

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Figure 12. The Conical Morel (Morchella conica). Natural size.—(Original.)

The Esculent Morel. (Morchella esculenta.)

This is the common morel and the most abundant of its tribe. It is distinguished principally by the more rounded shape of the cap, and the irregular pits which are formed by the ribs extending in all directions. The color is greyish or leaden in young specimens, but changes to a buff in mature plants. They are found singly or in groups, frequenting the borders of woods, appearing along the lane, in old orchards, and in the vicinity of evergreen trees. A colony of them lifting their sponge-like heads in the green grass is an inspiring sight to the fungus epicure who learns to look for them each season in the same haunts.

All morels should be crisp and fresh when eaten. If they have been frosted several times or softened by rain and age they should be rejected, as they prove somewhat indigestible under these circumstances.

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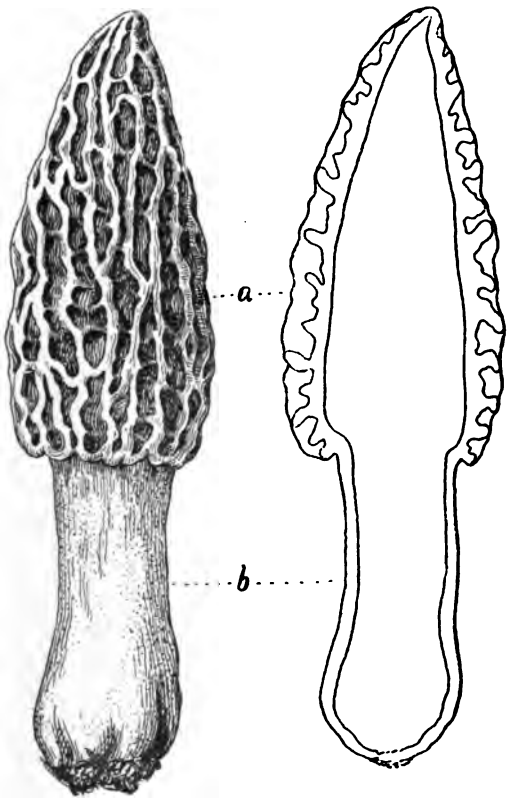

Fig. 13.

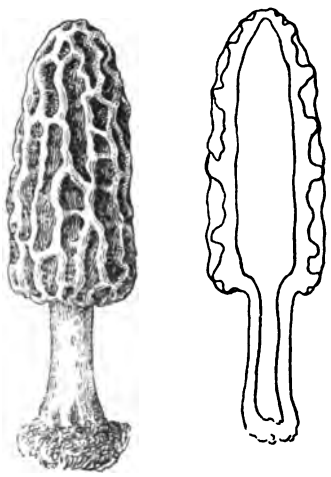

Fig. 14.

Figure 13. The Conical Morel. (a) a cap or pileus; (b) stem. The right hand figure represents a lengthwise section.
Figure 14. The Delicious Morel (Morchella deliciosa). Natural size.—(Original.)

PUFF-BALLS.

Puff-balls belong to one of the most interesting groups of fleshy fungi. Every person who frequents the fields and woods is familiar with the dust-filled, cotton-stuffed balls, which invite the attack of the small boy with a stick, but only the few are aware of the fact that they are a desirable and safe addition to the fungus bill of fare when in their early stage of growth. When in this condition they are quite solid and white inside considerably resembling cottage cheese in appearance. However, upon the first signs of discoloration and wateryness inside they should be rejected, for this is an indication of over-ripeness for eating.

The Lead Colored Puff-Ball. (Bovista plumbea.) Fig. 16.

A description of the development of one member of the group will suffice for all and for this purpose one of the small species has been chosen, the little Lead-colored Puff-ball.

A warm rain almost any time during spring and summer months is

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Figure 15. The Common Morel. This lot was collected in a short time from a woods on the Michigan Agricultural College farm.—(Original.)

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sure to bring this fungus into sight especially in sandy pastures. About one inch in diameter, it is nearly spherical in shape, quite smooth, and creamy inside and out.

Be on hand, if you want them, for they are very apt to cater to the appetites of the greedy larvae of certain insects if left for many hours.

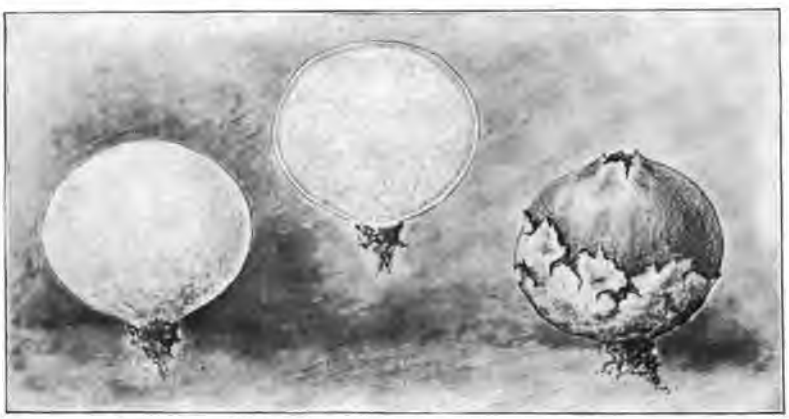

Figure 16. The Lead-colored Puff-ball (Bovista plumbea). The left hand figure represents this fungus when young, the central figure shows the same in section, while the mature condition of the fungus is shown at the right. Natural size.—(Original.)

This fungus is covered with two layers or coats, the inner one thinner and tougher than the outer. The cheesy interior portion is quite spongy, due to the presence of numerous minute, irregular cavities, each lined with a spore-bearing layer or hymenium. The thick walls surrounding these cavities are composed of interwoven mycelial filaments, some of which are much branched and thick walled, while the others are slender, thin walled and are connected with the basidia, or spore-bearing cells, in the hymenium. As the puff-ball matures the white interior portion becomes yellow or brownish and water soaked due to the melting of the basidia and thin-walled threads into a liquid condition.

This moisture soon dries out, the color becoming darker, while the thick-walled branched threads remain as a cottony mass, dusted full of spores. In the meantime the outer coat of the puff-ball has cracked and fallen away leaving the inner one like a lead-colored paper bag. A small opening forms in the apex of this bag and the mature puff-ball is ready to be stepped on.

Only a slight pressure is needed to send out a dark brown smoke-like puff of spore dust which quickly vanishes in air. The elastic property of the cottony stuffing causes the puff-ball to expand to its original size as soon as the pressure is removed and it is then ready for another squeeze.

The Separating Puff-Ball. (Lycoperdon separans.)

This is another puff-ball about the size of the foregoing one. Its outer coat is white at first and thickly covered with pointed warts or spines of the same color. This coating crumbles away in little fragments as the fungus ripens, thus uncovering irregular patches of the

inner coat which has changed from white to a yellowish brown. It also occurs commonly in fields, pastures and door yards during the growing season.

The Cup-Shaped Puff-Ball. (Lycoperdon cyathiforme.) Fig. 17, 21.

Among the larger puff-balls the present species is perhaps the most common as well as one of the best for the table. When full grown it is about once or twice the size of one's fist. It is usually in the form of a flattened sphere seated on a narrowed base.

The covering, at first white, becomes stained with purplish hues as the

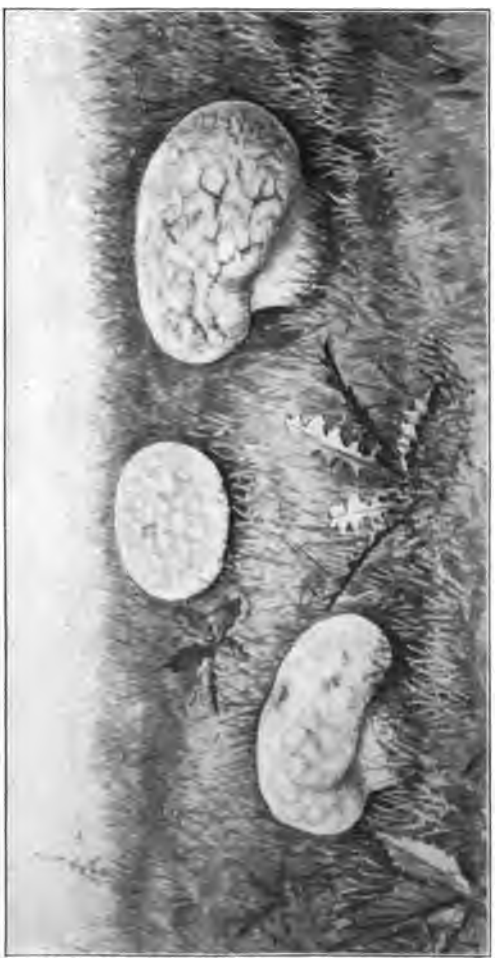

Figure 17. Three specimens of the cup-shaped Puff-ball (Lycoperdon cyathiform). The surface is just beginning to crack open and to show purplish stains. About one-fourth natural size.—(Original.)

fungus matures, cracking into somewhat angular areas and then flaking away when dry thus exposing the purple spore-mass. This the wind scoops out in time leaving only the cup-shaped base, the lower part of which does not change to a spore-mass (Fig. 21). Old pastures furnish a favorite place for this puff-ball where they sometimes occur in groups of several individuals.

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The Engraved Puff-Ball. (Lycoperdon caelatum.) Fig. 18.

This puff-ball is much like the preceding one in structure and behavior but can be readily distinguished by its larger size and the yellowish olive color of the mature spore-mass. The sterile base is sometimes the larger part of the fungus and is often anchored to the soil by a heavy root-like growth below. It is found in much the same places as the preceding species.

Figure 18. The Engraved Puff-ball (Lycoperdon caelatum). About one-half natural size. —(Original.)

The Giant Puff-Ball. (Borista gigantea.) Fig. 19.

The Giant puff-ball, a veritable fungus football, is not only the Goliath of its tribe but, when well developed, has no other rival in size among fungi. Thus marvelous stories are sometimes told about the dimensions to which this fungus occasionally attains. The largest specimens seen by the writer measured nearly sixty inches in circumference and weighed fifteen pounds; a fungus omelette for a whole neighborhood.

Its surface when young resembles white kid leather while its resemblance to a huge loaf of unbaked bread is very striking. How many of these fungus delicacies are kicked into oblivion every season by persons unfamiliar with their appetizing possibilities, there is no record to show; it suffices to say that the well informed fungus hunter would as quickly think of demolishing a basket of fresh eggs which he might happen to find as to destroy a good specimen of this fungus.

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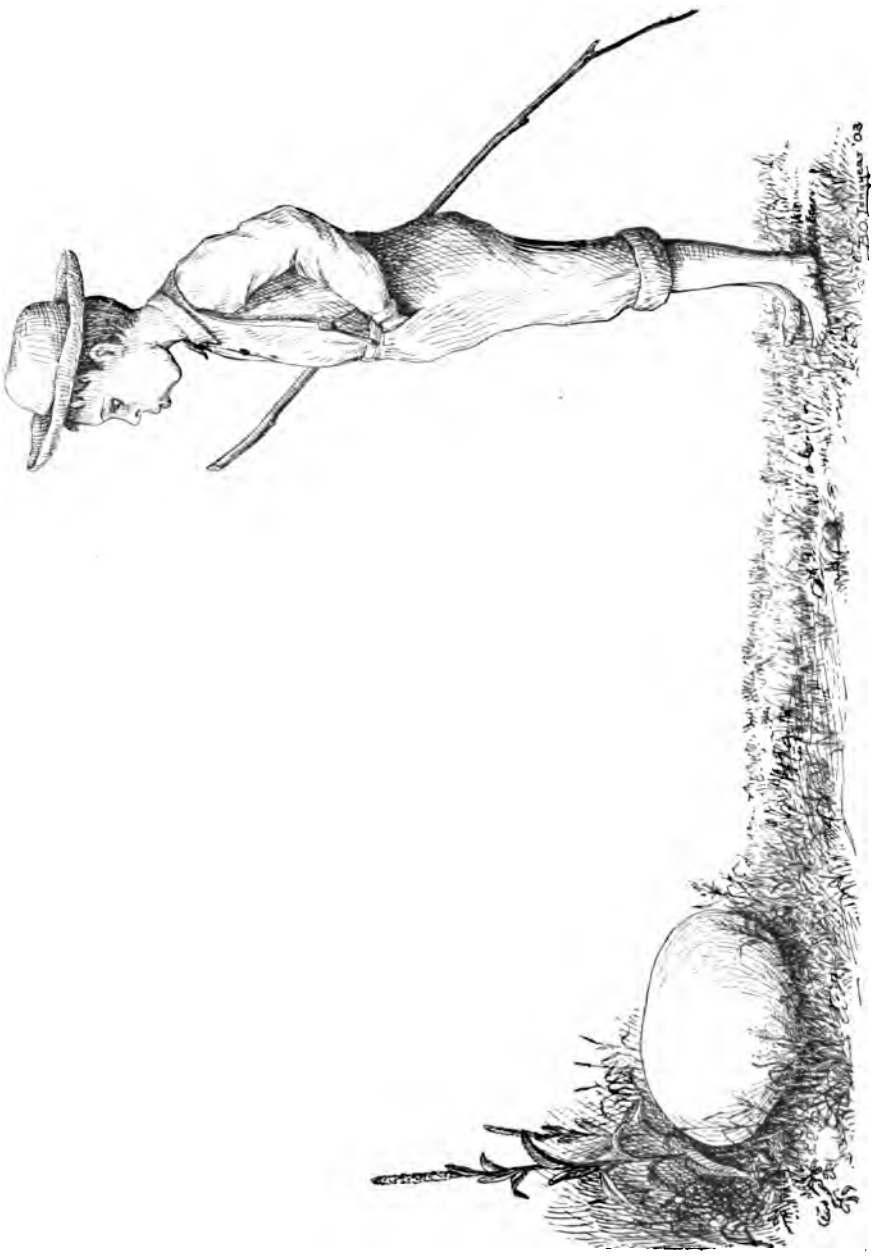

Figure 19. The Giant Puff-ball (Bovista gigantea).—(Original.)

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Like the two preceding puff-balls the spores of this species are distributed by the wind after the breaking away of the outer layers. The enormous number of spores which one of these puff-balls contains is as much beyond comprehension as the number of flakes in a snow storm. It occurs during the summer in fields and pastures.

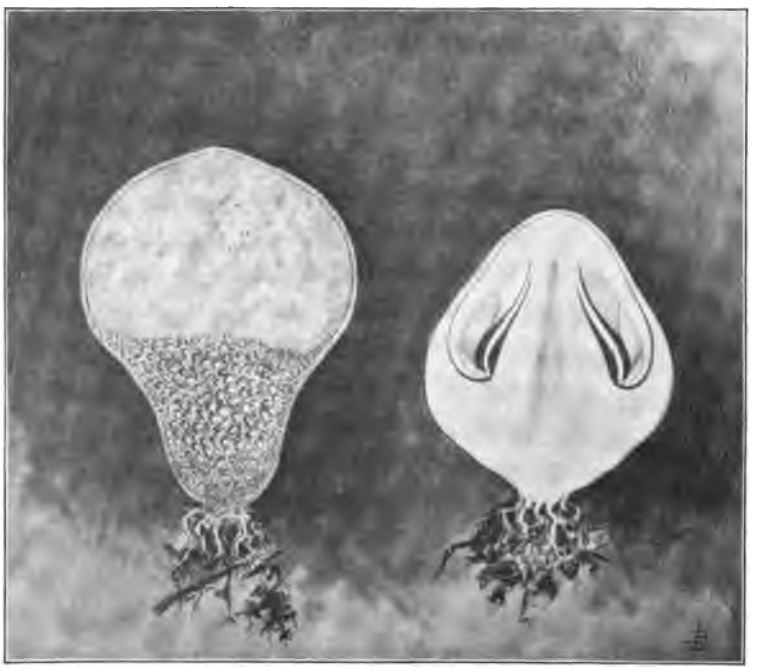

Figure 20. The left-hand figure represents a vertical section through a young plant of the Gemmed Puff-ball, showing the cellular structure of the stem-like lower half. This portion does not change into a spore mass but remains after the spores are discharged from the upper part. The right-hand figure shows a vertical section through the young, or egg stage of an amanita, a very poisonous fungus which grows in woods and which might possibly be mistaken for a young puff-ball, if not cut open. This fungus forms just below the surface of the soil and finally bursts the outer covering sending up a parasol-shaped mushroom. Natural size. (Original.)

The Gemmed Puff-Ball. (Lycoperdon gemmatum.) Fig. 20.

This little puff-ball is often quite abundant in woods and about decaying wood lying on the ground. The upper part is somewhat spherical and narrows into a stem-like base. The surface is adorned with little pointed warts which fall away at maturity leaving the surface marked with slight indentations. It is about one and one-half to two inches in height but sometimes makes up in numbers what it lacks in size. Thus in one case the writer found an area of several square yards, in a rather low woods, which was so thickly covered with these little puff-balls that it was almost impossible to cross it without treading on many of them. At first entirely white they become yellowish brown throughout, the spores escaping when mature through a small opening in the top.

Several other species of puff-balls are sure to be met with in our state by those who hunt mushrooms, but as they do not differ much in structure or edible qualities from those already described it seems unnecessary to give them special mention in this connection.

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RECIPES.

Collecting.--In collecting morels and puff-balls, or any other fungi intended for eating, discard all specimens that are overmature or infested with larvae. Puff-balls should be perfectly white inside when broken open. Yellowish stains in the center or near the base are signs of approaching ripeness and although not necessarily poisonous in this condition they develop bitter or unpleasant flavors, unfitting them for use as food. If dirt and adhering soil be removed when the plants are being collected much trouble in washing them clean may be avoided.

Cooking.

A great many ways have been followed in the cooking of edible fungi; in brief they are adapted to almost any treatment given to the oyster. Thus they may be stewed, baked, fried, broiled and escalloped, and made into croquettes or pâtés. Certain kinds, however, are treated in ways better suited to retaining or bringing out their natural flavors.

The following recipes have been selected as being specially adapted to the morels and puff-balls:

Morels.

Fried.—Wash, drain, roll in flour, fry in butter or fat, serve hot.

Stuffed.—Select the freshest specimens, open the stems at the base, wash carefully and wipe, fill with veal stuffing, anchovy, or any other rich stuffing, close the ends, bake or dress between thin slices of bacon. Serve with a sauce.

Simple and dainty.—Split the morels lengthwise, wash, drain, fry lightly in butter about twenty minutes, season and serve on hot toast.

Puff-Balls.

To fry.—Remove the outer rind, slice, dip into beaten egg, then into bread crumbs, fry until lightly browned in butter or fat as for French toast. A batter of milk and egg may be used in which to dip the slices before frying. Serve on a hot plate.

To stew.—Cut into small pieces, boil for fifteen minutes in a little water, pour off the water, dust with a little flour, add a small quantity of milk or cream with butter, salt, pepper, and lastly a little chopped parsley, stew slowly for five minutes, serve. They may also be used in pâtés. —*McIlvane.*

Salads.—These may be made from the puff-balls, either raw or stewed, by mingling with any of the usual salad materials. Use the ordinary salad dressing.

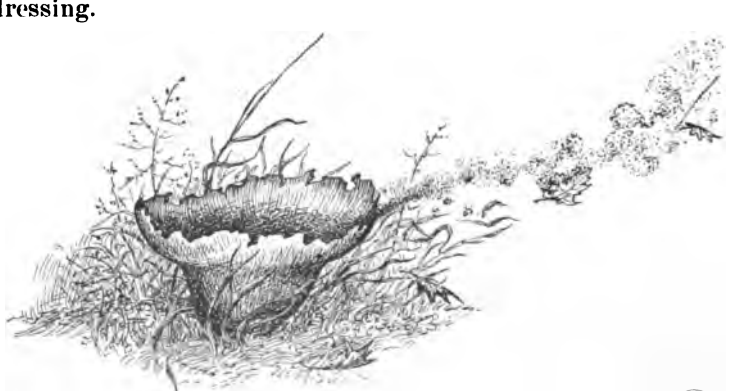

Figure 21. The Cup-shaped Puff-ball. The wind scoops out the dry spore-mass and leaves the sterile cup-like base.—(Original.)

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